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How Food Production Affects The Environment

Agriculture is charged with the job of feeding the people of the world. The job must be done with two inputs: our natural resources — air, land, water, and living things — and the technology that enables the agricultural industry to increase efficiency to keep pace with the growing demand for food.

The industry must constantly balance use of the two inputs — natural resources and technology. One must not be relied on at the expense of the other. Enough food cannot be economically produced without use of both inputs.

The following material describes how food production affects the environment at a time when agricultural leaders and educators continue to weigh the balance of the two inputs they must use to assure an adequate food supply for our nation.

AIR POLLUTION

The public is aware of critical air pollution problems that our large cities face and the possible effect of air pollution on man's health. However, most people are less aware of how air pollution affects plants.

National losses of food and fiber crops, ornamental plants, turfgrasses, and trees caused by air pollution are estimated at more than $500 million each year. The amount of injury to crops and ornamental plants is increasing each year in Illinois, in the United States, and in many of the industrial and densely populated areas of the world.

Plant injury is common near large cities, smelters, refineries, electric power generation plants, airports, and highways and streets where traffic is heavy. Most frequent causes of plant injury are incinerators and refuse dumps, pulp and paper mills, as well as coal, gas, and petroleum-burning furnaces.

Air pollution causes these effects on plants: matted foliage, burning at the tips or edges of the leaves, growth suppression, early leaf drop, delayed maturity, abortion or early drop of blossoms, low yields, and lower quality.

The seriousness of the damage and the areas affected by air pollution depend primarily on these factors: kind and concentration of the pollution, distance from the source, length of exposure, and meteorological conditions.

The more important air pollutants are sulfur dioxide, fluorides, chlorides, ozone, peroxyacetyl nitrate (PAN), and ethylene.

Other air pollutants include various fumes, odors, dusts, aerosols, organic and inorganic acids, ammonia, carbon monoxide, hydrogen sulfide, aldehydes, oxides of nitrogen, tars, and vapors or spray drift from hormone-type weed sprays.

Agriculture's contribution to the total air pollution problem is relatively small and local, except possibly for blowing dust; but air pollution's effects on agriculture and food production can be serious.

PLANT NUTRIENTS

Ecologists are concerned about phosphorus and nitrates in water because they can cause excessive algae growth. Algae in small quantities are beneficial because they add oxygen to the water and provide food for fish. Excessive algae "blooms" that frequently develop in nutrient-rich wastes may cause an unpleasant taste and odor in water. Fish sometimes die when decaying plant residues exhaust the oxygen supply in water.

Health officials are interested in nitrogen because high concentrations of nitrates in drinking water can be toxic to babies under one year one of age. High levels of nitrogen can cause the "blue baby" sickness (methemoglobinemia).

PHOSPHORUS

Research shows that much of the phosphorus in surface waters comes from domestic sewage and animal waste. Phosphorus from fertilizer sources is only a secondary source. Phosphorus applied to the soil is bound tightly to the soil particles and only enters the surface waters in very small concentrations unless soil particles erode into the stream.

NITRATES

The sources of nitrates found in ground water may be seepage from septic tanks and feedlots, natural accumulations of organic matter in the soil, industrial sources, and fertilizers under some conditions. Nitrates found in streams may be from the sources mentioned above or from sewage treatment plant effluents, runoff from feedlots, and leaching from crop residues.

Although fertilizer has been blamed for increasing the nitrates in some Illinois streams, it is only one of several sources that contribute to the total amount of nitrogen available from plant growth.

Dr. S. R. Aldrich, University of Illinois agronomist, has estimated the major sources of nitrogen for the total land area in the continental United States. They are: 37 percent from released soil organic matter; 18.5 percent from livestock waste; 18.5 percent fixed by soil organisms; 9 percent added by rainfall; 4 percent from human waste; and 13 percent from fertilizers, according to Dr. Aldrich's 1970 estimate.

Fertilizers are used to supplement the nitrogen available from natural sources. While fertilizer nitrogen is a small part of the total nitrogen available to growing plants, it has been the major technological advancement responsible for doubling the yields of many of our crops during the 30 or so years.

ANIMAL WASTE

The agricultural revolution has caused major changes in livestock handling. In the past, animal herds were relatively small and manure was returned to the land where nutrients were used by growing crops and organic matter was incorporated into the soil. This system is still used on the majority of our Illinois farms which produce cattle or hogs in small numbers.

The change to larger farm units and intensive livestock production has decreased the importance of manure as fertilizer. With increased concentrations of livestock and availability of low-cost fertilizer, it no longer pays to spread manure, because the farmer can more profitably spend his time in other activities.

Accumulated manure may give off odors. It may provide a spawning ground for vermin; and when dry it may become a source of dust. During rainstorms it may produce runoff that reduces the oxygen content of stream water and kills fish, and it may be the source of other pollutants found in streams.

Livestock producers and researchers are looking for waste treatment and disposal methods that have low labor requirements, reduce nuisance conditions, and improve sanitation at minimum cost. Such methods are being developed through research at the University of Illinois.

Most Illinois feedlots are small and in the hands of farmer businessmen who have always made their living from the land and who are concerned about conservation. They are also people who do not want to spoil the environment in their neighorhood because they are concerned about their community.

The farmer doesn't like the thought of polluting his own water or living with malodors any more than other people do.

PESTICIDES

Pesticides, when used properly, have resulted in great benefits to man and his surroundings. But when misused or used carelessly, they have caused harm. Through the years the adverse effects have been relatively minor in relation to the great benefits from pest control.

In recent years public attention has been focused on the chlorinated hydrocarbon insecticides as causes of environmental contamination. Biological magnification of residues in tissues of animals is the most complex and serious consequence of environmental contamination with insecticides. This phenomeon appears to be limited to the fat-soluble pesticides.

Without question we must constantly monitor pesticide use to avoid contamination of our environment. But we cannot avoid pesticide use if we want to continue to feed our population and maintain high standards of public health. This means we will have to use pesticides for years to come.

The law requires that all pesticide products be registered before they can be marketed in interstate commerce. Before such registration is granted, the manufacturer must provide scientific evidence that the product will be effective against the pest or pests listed on the label, and will not injure humans, crops, livestock, and wildlife when used as directed.

Pest control programs that involve the use of pesticides are monitored for any adverse effects on wildlife, fish, and other non-target organisms, such as beneficial insects.

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